

**What is claimed is:**

1. A system for processing a workpiece (5) located in a predefined process station (1) at a plurality of process sites (4) comprising at least one process tool (7) for processing said workpiece (5) at each process site (4) and a recognizing means for recognizing whether said process tool (7) is located in said process station (1),

characterized in that

said recognizing means (20; 200) is designed to identify each process site (4) on said workpiece (5).

2. The process system as set forth in claim 1, characterized in that a means (8) is provided for programming said process parameters for each process site (4) and said process parameter programming means (8) programs said process parameters on the basis of said process sites (4) identified in said recognizing means (20; 200).

3. The process system as set forth in claim 1, characterized in that said recognizing means (20) comprises an imaging means for imaging at least one section of said workpiece (5) in which at least one process site (4) is located.

4. The process system as set forth in claim 3, characterized in that said imaging means (20a) is mounted on said tool (7).

5. The process system as set forth in claim 3, characterized in that said imaging means (20a) is arranged integrally in said tool (7).

6. The process system as set forth in claim 3, characterized in that said imaging means (20a) is arranged in said process station (1) and images at least part of said process station (1) in which at least one workpiece (5) is located.

7. The process system as set forth in claim 3, characterized in that said imaging means (20a) is a camera.

8. The process system as set forth in claim 7, characterized in that said camera is a video camera or an infrared camera.

9. The process system as set forth in claim 4 or 5, characterized in that said process tool (7) comprises a light source which illuminates said process station (1) or a part thereof ahead of said process tool (7).

10. The process system as set forth in claim 3, characterized in that said recognizing means (20) comprises furthermore an image processing means (21) and an image memory (22), said image processing means (21) comparing a pixel map imaged by said imaging means (20a) with programmed process site maps memorized in said image memory (22) and outputting an identification signal ES as to identification of a programmed process site when agreement is established between said imaged pixel map and a memorized pixel map of said process sites.

11. The process system as set forth in claim 10, characterized in that said image processing means (21) compares said image data of said pixel map imaged by said imaging means (20a) to said image data of said pixel map memorized in said image memory (22) with the aid of a logic (FL).

12. The process system as set forth in claim 11, characterized in that said logic (FL) is a fuzzy logic.

13. The process system as set forth in claim 1, characterized in that said recognizing means (20) comprises an emitter means (20c) applied to each process site (4) of said workpiece (5) for outputting a signal characterizing said process site (4) and a detector means (20b) for detecting the corresponding signal.

14. The process system as set forth in claim 13, characterized in that said emitter/detector means (20c, 20b) is an infrared system.

15. The process system as set forth in claim 1, characterized in that said recognizing means (20) comprises a code (20e) applied to each process sites (4) of said workpiece (5) and characterizing each process site, and a code reading means (20d) for reading each code (20e), said recognizing means (20) identifying each process site on the basis of said read code.

16. The process system as set forth in claim 1, characterized in that said process tool (7) is a screw driver or nut runner and said process parameters programmed by said process parameter programming means (8) are a programmed torque and/or predefined torsion angle.

17. The process system as set forth in claim 1, characterized in that said workpiece (5) is a motor vehicle or part of a motor vehicle, said process site (4) being predefined assembly sites on said motor vehicle or on said part, said process station (1) being a predefined station of an assembly line and said process relates to assembling items to predefined assembly sites.

18. The process system as set forth in claim 1, characterized in that an enabling means is provided which does not enable processing by said process tool (7) with said programmed process parameters until said recognizing means (20) has identified a programmed process site (4).

19. The process system as set forth in claim 1 and 3, characterized by a counter means for counting how often said recognizing means (20) identifies a process site and how often processing by said process tool (7) with said programmed process parameters is implemented at said process site (4).

20. The process system as set forth in claim 14, characterized in that said code (20e) applied to said process site (4) is a process bar code.

21. The process system as set forth in claim 1 comprising a means for sensing actual parameters during said process operation at each process site (4) and a comparator means (10) for comparing said sensed actual process parameters to said design process parameters and for controlling said process tool (7) so that in said process operation said actual and said design process parameters are brought into agreement.

22. A process tool (7) for processing a workpiece (5) at a plurality of process sites (4) comprising a recognizing means (20;200) for identifying each process site (4) on said workpiece (5).

23. The process tool (7) as set forth in claim 22, characterized in that said recognizing means (20) comprises an imaging means (20a) for imaging at least one section of said

workpiece (5) in which at least one process site (4) is located, said imaging means (20a) being mounted on said tool (7) or arranged integrally in said tool (7).

24. A system for processing a workpiece (5) located in a predefined process station (1) at a plurality of process sites (4) with programmed process parameters, comprising at least one process tool (7) for processing said workpiece (5) at said programmed process sites (4) and a recognizing means (200) for recognizing whether said process tool (7) is located in said process station (1),

characterized in that

said recognizing means 200 is designed

- to identify the location of said process tool (7) in said process station (1);
- to identify the location of said workpiece (5) in said process station (1); and
- to determine therefrom the location of said process tool (7) relative to each process site (4).

25. The process system as set forth in claim 24, characterized in that said process tool (7) is provided with at least one marking (202) and said recognizing means (200) comprises an imaging means (201) for imaging said process station (1), an image processing means (203) identifying the location of said process tool (7) by processing the image of said at least one marking (202) and of said workpiece (5).

26. The process system as set forth in claim 25, characterized in that said imaging processing means (203) analyze movement maps of said process tool (7) in establishing whether a predefined number of process operations at each of said process sites (4) has been implemented.

27. The process system as set forth in claim 24, characterized in that an enabling means does not enable said identified process tool (7) at a programmed process site (4) until said recognizing means (200) has identified a predefined number of process operations at a previous process site (4).

28. The process system as set forth in claim 24, characterized in that said recognizing means (200) sets each process parameter on the basis of said recognized location of said process tool (7) relative to said process site (4).

29. The process system as set forth in claim 24, characterized in that said recognizing means (200) senses the speed at which said workpiece (4) is moved on the basis of time-tracking the change in position of one or more process sites (4).

30. The process system as set forth in claim 24, characterized in that said recognizing means (200) identifies an angular orientation of said process tool (7) relative to a programmed process site (4).

31. The process system as set forth in claim 27, characterized in that said process tool (7) comprises a set of process units (71-74) including a programmed orientation, said enabling means enabling said process units at a subsequent process site only when a counter means of said recognizing means (200) has established that said process units (71-74) have assumed a predefined number of angular orientations at a previous process site.

32. The process system as set forth in claim 24, characterized in that said workpiece (5) is a motor vehicle or part of a motor vehicle, said process site (4) is a predefined assembly site on said motor vehicle or on said part, said process station (1) is a predefined station of a motor vehicle assembly line, said process tool (7) comprises one or more screw drivers or nut runners, and said programmed process parameters are bolting parameters of said one or more screw drivers or nut runners.

33. The process system as set forth in claim 32, characterized in that said bolting parameters comprise a torque and/or a torsion angle of said one or more screw drivers or nut runners.

34. The process system as set forth in claim 25, characterized in that said recognizing means (200) comprises a workpiece memory (204) for memorizing workpiece dimensions, said image processing means (204) determines the location of a reference coordinate point of said workpiece image (51) and determines the location of said tool marking (2902) in a system of coordinates (x, y) fixed relative to said process station (1) by analyzing the spacings between said coordinates of said marking and each

process site (4) with reference to said workpiece dimensions held in said workpiece memory (204).

35. The process system as set forth in claim 30 and 34, characterized in that said tool is provided with two markings (202, 202') and said image processing means (203) determines said angular orientation of said tool relative to said process site (4) on the basis of analyzing said coordinates of both markings relative to said coordinates of said process sites (4).